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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
097622,405	08/17/00	GREENAWAY	A 124-786

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MM92/1004

EXAMINER

AMARI, A

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 10/04/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/622,405

Applicant(s)

GREENAWAY ET AL.

Examiner

Amari, Alessandro V.

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-12 and 15-18 is/are rejected.
- 7) ☒ Claim(s) 9, 13, 14, 19 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 August 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Element 14 in Figure 23. Correction is required.

Specification

2. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.
3. The disclosure is objected to because of the following informalities:
Illumination source cited as element 21 on pages 27, line 27, and page 28, lines 7,12 should have been cited as element 13.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 4, 5, 7, 8, 11, 12, 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Park et al. U.S. Patent 5,526,336.

In regard to claim 1, Park et al. discloses (see Figure 7) an apparatus for producing simultaneously a plurality of spatially separated images from an object field comprising an optical system (9A, 21, 3, 4, 5) arranged to produce an image associated with a first focus condition; a diffraction grating (4) arranged to produce, in concert with

the optical system, images associated with each diffraction order (7, 8) and means for detecting the images (11), wherein the optical system, diffraction grating and detecting means are located on an optical axis (as shown in Figure 7) and the diffraction grating is located in a suitable grating plane (as shown in Figure 7) and is distorted substantially according to a quadratic function so as to cause the images to be formed under various focus conditions as described in column 4, lines 12-16.

In regard to claim 4, Park et al. discloses that the origin of the distortion function of the diffraction grating is displaced from the optical axis as described in column 4, lines 16-22.

In regard to claim 5, Park et al. discloses the origin of the quadratic distortion function is displaced to cause alignment along the optical axis of the images associated with each diffraction order as described in column 4, lines 16-25.

In regard to claim 7, Park et al. discloses that the diffraction grating is any one of an amplitude-only diffraction grating, a phase only diffraction grating or a phase and amplitude diffraction grating as described in column 4, lines 1-10.

In regard to claim 8, Park et al. discloses the diffraction grating is polarisation sensitive as described in column 4, lines 40-50.

In regard to claim 11, Park et al. discloses that the diffraction grating is a reflective grating or a transmissive grating as described in column 4, lines 1-10.

In regard to claim 12, Park et al. discloses the grating is any of a two-level (binary) structure, a multi-level (digitised) structure or a continuous-level (analogue) structure as described in column 3, lines 64-67 and column 4, lines 1-10.

In regard to claim 15, Park et al. discloses that the apparatus produces substantially in focus images in a common image plane (11A), from a plurality of object planes (7, 8) as shown in Figure 7.

In regard to claim 16, Park et al. discloses the object planes are coincident with the image plane as shown in Figure 7.

In regard to claim 17, Park et al. discloses that each object plane contains an array of elements, capable of existing in at least two states and in which the detector means is capable of distinguishing between said states as described in column 3, lines 49-60.

In regard to claim 18, Park et al. discloses that the apparatus is adapted for reading data from a three dimensional optical storage medium wherein object planes are located within the medium and the detecting means is capable of producing a signal dependent on the state of the elements as described in column 3, lines 49-63.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2, 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. U.S. Patent 5,526,336 in view of Lee U.S. Patent 5,721,629.

In regards to claims 2 and 3, Park et al. teaches the invention as set forth above but does not teach that the function according to which the grating is distorted includes

further terms for producing different amounts of spherical aberration in the images associated with each diffraction order nor does Park et al. teach that the spherical aberration of images associated with each diffraction order is arranged to correct for spherical aberration associated with the different depths of substantially parallel planes in object or image space. Lee teaches that the function according to which the grating is distorted includes further terms for producing different amounts of spherical aberration in the images associated with each diffraction order as described in column 3, lines 35-67. Lee also teaches that the spherical aberration of images associated with each diffraction order is arranged to correct for spherical aberration associated with the different depths of substantially parallel planes in object or image space as described in column 3, lines 35-52. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the grating of Park et al. to correct for spherical aberration as taught by Lee in order to compensate for the spherical aberration caused by the different thicknesses of the optical storage media.

In regard to claim 6, Park et al. teaches the invention as set forth above but does not teach that the diffraction grating comprises a set of two or more diffraction gratings designed such that the various diffraction orders are spatially separated. Lee does teach (see Figures 7A, 7B, 7C) that the diffraction grating comprises a set of two or more diffraction gratings (27a, 28a) designed such that the various diffraction orders are spatially separated as described in column 3, lines 35-50. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the

grating of Park et al. to incorporate the features of the grating as taught by Lee so that the grating exhibits low aberration.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. U.S. Patent 5,526,336 in view of Torok U.S. Patent 3,861,784.

In regard to claim 10, Park et al. teaches the invention as set forth above but does not teach that the diffraction grating is a programmable grating. Torok teaches a diffraction grating that is programmable. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the programmable grating as taught by Torok in the invention of Park et al. in order to provide selectivity of foci for different diffraction orders due to variation in layer thickness of the optical media.

Allowable Subject Matter

9. Claims 9, 13, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 14 would be allowable if rewritten to overcome the claim objection set forth in this Office Action and to include all of the limitations of the base claim and any intervening claims.

10. Claim 9 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the diffraction grating comprises two gratings sensitive to different polarisations and arranged such that the diffraction orders produced by said gratings are spatially separated" as set forth in the claimed combination.

Claims 13 and 14 are allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "adapted for forming images on a plurality of image planes, from a single object plane" as set forth in the claimed combination.

Claim 19 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "a dispersive system for introducing an offset to an input beam of radiation, said offset being perpendicular to the optical axis and proportional to the wavelength of the input radiation, whilst leaving the beams at each wavelength following parallel paths" as set forth in the claimed combination.

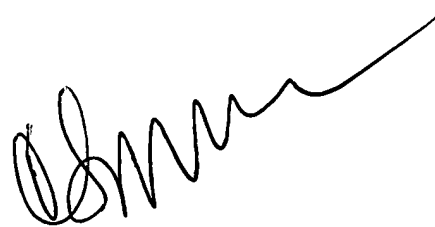
The prior art of record, Park et al. in view of Lee teaches that diffraction gratings can consist of two gratings but does not teach that the two gratings are sensitive to different polarisations and no motivation or teaching is present to modify this difference as derived. The prior art of record, Park et al. teaches an apparatus for producing images in a common image plane from a plurality of object planes but does not teach forming images on a plurality of image planes from a single object plane and no motivation or teaching is present to modify this difference as derived. Park et al. teaches an apparatus for producing simultaneously a plurality of spatially separated images from an object field but does not teach a dispersive system for introducing an offset to an input beam of radiation, said offset being perpendicular to the optical axis and proportional to the wavelength of the input radiation, whilst leaving the beams at each wavelength following parallel paths and no motivation or teaching is present to modify this difference as derived.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (703) 306-0533. The examiner can normally be reached on Monday-Friday from 8:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on (703) 308-1687. The fax phone numbers for the organization where this application is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ava QVA
September 24, 2001



Cassandra Spyrou
Supervisory Patent Examiner
Technology Center 2800